USGS-NPS VEGETATION MAPPING PROGRAM

Vegetation Classification
of
Tuzigoot National Monument

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VEGETATION SAMPLING AND CLASSIFICATION

Introduction

This report presents the results of the vegetation classification portion of the NPS/USGS Vegetation Mapping Program at Tuzigoot National Monument (TNM), Arizona. The methods for sampling vegetation are discussed in reference to the standard procedures in *Field Methods for Vegetation Mapping* (The Nature Conservancy 1994). This report includes the vegetation classification for TNM, a field key to the vegetation types on TNM, and descriptions of each vegetation type. The field data sheets with information gathered from TNM and the electronic data files are provided as supplements.

Methods

The methods used for developing the vegetation classification for TNM followed the standards described in *Field Methods for Vegetation Mapping*. The small size of the Monument permitted sampling of the entire area.

The sampling strategy included three stages: 1) reconnaissance, 2) aerial photography interpretation, and 3) plot location. First, a reconnaissance of TNM was conducted to characterize the vegetation across important environmental gradients and to identify its relationship to previous vegetation classifications. The gradients recognized were moisture, topography, and site disturbance. During the reconnaissance, twenty preliminary vegetation types, based on plant species dominance and composition, were recognized. The initial list of types included four vegetation types identified in the 1995 Western Regional Vegetation Classification.

The second stage of the sampling strategy was to delineate polygons of relatively homogeneous vegetation within the project area by examining infrared aerial photographs. Preliminary vegetation types were coarsely delineated by photo interpretation of canopy cover and vegetative structure. Thirty-five homogenous vegetation polygons were recognized after inspecting the aerial photographs.

The final stage of the sampling strategy was to locate plots within the thirty-five polygons that encompassed the range of vegetation types on the Monument. Plots were subjectively located to represent the variation of the vegetation within the polygon.

All vegetative cover descriptions at Tuzigoot National Monument were developed using data collected from square and rectangular plots. Plots varied in size from 5m x 20m, for primarily herbaceous vegetation, to as large as 20m x 20m, for primarily arborescent and shrubby woodland vegetation. Each plot was placed to encompass the variability of vegetation in the polygon and to contain the typical and representative vegetation for the sample unit.

Results

Inspection of plot data, discussions with experts, and review of literature describing Arizona vegetation resulted in the definition of twenty-two vegetation types. This classification included five woodland types, eight shrubland types, and nine herbaceous types. Of those, three are recognized types within the existing vegetation classification of the western U.S. (Bourgeron and Engelking 1994). They include *Populus fremontii-Salix Gooddingii* Woodland, *Juniperus erythrocarpa-Canotia holocantha* Woodland, and *Prosopis velutina/Celtis reticulata* Shrubland. The remaining sixteen apparently are new to science.

Some vegetation types on the Monument had relatively uniform floristic patterns but differed in their structure. For example, a type with relatively similar understory composition could have a shrub layer on some areas of the Monument and be lacking the shrub layer in other areas. If these floristically similar but structurally different vegetation types occurred in similar environments, they were considered to be developmental stages of the same vegetation type and were therefore classified as a single type.

Many of the vegetation types recognized on TNM were highly disturbed, due to past human influence (see Discussion section). This disturbance caused some difficulty in placing the existing vegetation types on the Monument within the National Vegetation Classification System. Disturbed vegetation types, either dominated by exotic species or the result of obvious site alteration, were classified as the most closely related previously described natural, native vegetation whenever possible. When it was impossible to recognize the most closely related natural, native vegetation, a new vegetation type was defined.

Altered hydrologic regimes created the greatest difficulty to vegetation classification because residual species from a previous hydrologic regime were mixed with indicators of other site conditions. When this species mixing was extensive and the resulting vegetation was judged to be long-lived, these vegetation types were recognized as new, transitional types whose relationship to other similar vegetation types in the classification is unclear. For example the *Populus fremontii/Prosopis velutina* Woodland (Cottonwood/Mesquite Woodland) type at TNM has a cottonwood component that reflects history of flooding and a mesquite component that represents more upland situations. This vegetation was recognized as a new type to the classification rather than lumping it with previously defined Cottonwood types or Mesquite types.

If the transitional vegetation was ephemeral (with boundaries that can change from year to year) but had clearer floristic or hydrologic affinities with other recognized vegetation types, the type was lumped with the most closely related type in the classification. For example, the *Typha angustifolia* marsh (narrowleaf cattail marsh) at TNM contains homogenous patches dominated by *Typha angustifolia, Scirpus validus* and *Eleocharis parishii,* respectively. Due to the extreme temporal variability of this vegetation (a given area of the marsh dominated by *Typha angustifolia* one year can be dominated by *Scirpus validus* or *Eleocharis parishii* the next), these vegetation units were lumped and recognized as a single type in the classification.

The classification of vegetation on Tuzigoot National Monument within the National Vegetation Classification System hierarchy follows. Only pertinent levels of that system are listed. A vegetation key, using plant species presence and abundance measures to facilitate identification of the vegetation types, appears in the next section. Descriptions of each type to support the classification complete this report.

Classification

"*" indicates a new Formation in the National Vegetation Classification System.

II. WOODLAND. Open stands of trees over 5 meters tall with crowns usually not touching (generally 25-60% cover)

II.A. Evergreen woodland (evergreen species generally contribute >75% of the total tree cover)

II.A.4. Temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

JUNIPERUS ERYTHROCARPA WOODLAND ALLIANCE
***Juniperus erythrocarpa—Canotia holocantha* Woodland**

II.B. Deciduous woodland (evergreen species generally contribute >75% of the total tree cover)

II.B.2. Cold-deciduous woodland

II.B.2.N.b. Seasonally/temporarily flooded cold-deciduous woodland

POPULUS FREMONTII WOODLAND ALLIANCE
***Populus fremontii—Salix gooddingii* Woodland**

*II.B.2.N.g. Intermittently flooded cold-deciduous woodland

POPULUS FREMONTII (RIPARIAN) WOODLAND ALLIANCE
***Populus fremontii/Hordeum jubatum* Woodland**

***Populus fremontii/Prosopis velutina* Woodland**

II.C. Mixed evergreen-deciduous woodland (evergreen and deciduous species generally contribute 25-75% of the total tree cover)

II.C.2. Mixed broad-leaved evergreen—cold-deciduous woodland

II.C.2.N.a. Mixed broadleaf evergreen—cold-deciduous woodland

CELTIS RETICULATA WOODLAND ALLIANCE
***Celtis reticulata—Quercus turbinella* Woodland**

III. SHRUBLAND (SCRUB). Shrubs generally greater than 0.5 m tall with individuals or clumps not touching to interlocking (generally forming >25% canopy cover, - tree cover <25%) Shrub cover may be less than 25% in cases when the cover of each of the other lifeforms present is less than 25% and shrub cover exceeds the cover of other lifeforms.

III.A. Evergreen shrubland (scrub) (evergreen species generally contribute >75% of the total shrub cover)

III.A.5. Extremely xeromorphic evergreen shrubland

III.A.5.N.a. Evergreen extremely xeromorphic subdesert shrubland

CANOTIA HOLOCANTHA SHRUBLAND ALLIANCE
***Canotia holocantha/Aristida purpurea* Shrubland**

LARREA TRIDENTATA SHRUBLAND ALLIANCE
***Larrea tridentata/Aristida purpurea* Shrubland**

III.A.5.N.b. Falcultatively deciduous extremely xeromorphic subdesert shrubland

ATRIPLEX CANESCENS SHRUBLAND ALLIANCE
***Atriplex canescens/Muhlenbergia porteri* Shrubland**

III.B. Deciduous shrubland (deciduous species generally contribute >75% of the total shrub cover)

III.B.2. Cold-deciduous shrubland

*III.B.2.N.f. Intermittently flooded cold-deciduous shrubland

CHILOPSIS LINEARIS SHRUBLAND ALLIANCE
***Chilopis linearis* Shrubland Alliance**

III.B.3. Extremely xeromorphic deciduous shrubland

III.B.3.N.a. Extremely xeromorphic deciduous shrubland without succulents

PROSOPIS VELUTINA SHRUBLAND ALLIANCE
***Prosopis velutina/Celtis reticulata* Shrubland**

***Prosopis velutina/Guterriezia sarthorae* Shrubland**

***Prosopis velutina/Hordeum jubatum* Shrubland**

V. HERBACEOUS Herbs (graminoids, forbs and ferns) dominant (generally forming at least 25% cover). Trees, shrubs and dwarf-shrubs generally with less than 25% cover.

V.A. Perennial graminoid. Perennial graminoids (grasses) generally contribute to >50% of total herbaceous cover.

V.A.5. Temperate or subpolar grassland

V.A.5.N.d. Medium-tall bunch temperate or subpolar grassland

ERAGROSTIS LEHMANNIANA HERBACEOUS ALLIANCE
***Eragrostis lehmanniana* Herbaceous Alliance**

V.A.5.N.i. Intermittently flooded temperate grassland

MUHLENBERGIA ASPERIFOLIA HERBACEOUS ALLIANCE
***Muhlenbergia asperifolia—Eleocharis parshii* Herbaceous Vegetation**

V.A.5.N.l. Seasonally flooded/temporarily flooded temperate grassland

TYPHA ANGUSTIFOLIA HERBACEOUS ALLIANCE
***Typha angustifolia* Herbaceous Alliance**

V.A.5.C. Planted/Cultivated temperate or subpolar grassland

V.B. Perennial forb vegetation

V.B.2. Temperate or subpolar annual perennial forb vegetation

V.B.2.N. Natural/seminatural temperate or subpolar perennial forb vegetation

V.B.2.C. Cultivated/semicultivated temperate or subpolar perennial forb vegetation

V.D. Annual graminoids or forbs

V.D.2. Temperate or subpolar annual grassland or forb vegetation

V.D.2.N.e. Low temperate intermittently exposed annual forb vegetation

Discussion

TNM and vicinity has a long history of human-derived influences to vegetation. Pre-Columbian people occupied this section of the Verde River Valley for centuries and engaged in agriculture and alteration of flooding patterns. Post-Columbian civilization has had dramatic impacts on vegetation pattern and natural processes affecting their development. Notable alteration has included: 1) deposition of mine, alteration of hydrologic regimes and patterns, and direct manipulation of vegetation through planting and cropping in the flood plain; 2) introduction of livestock; and 3) possible alteration of fire frequencies.

These combined factors have led to a vegetation pattern that is reflected in a confusion of species distributions that indicate past establishment patterns and current growing conditions. For example, the effect of construction of a weir dam has created an environment for and is currently expanding the distribution of marshlands. The marsh on TNM includes the recognizable vegetation type, narrowleaf cattail marsh, and a plethora of vegetation units that combine marsh species with upland (non-wetland obligates) and cultivated plants. These types of disturbance regimes make it difficult to place the vegetation of TNM into a wider geographic context.

In addition, very few vegetation classifications based on floristic and physiognomic characteristics are available for the region of Arizona containing TNM. Consequently, many of TNM's vegetation types cannot be compared to any previous vegetation study. This paucity of information in conjunction with the extensive disturbance history of TNM and surrounding areas makes interpretation and classification of its vegetation tenuous. An expanded reconnaissance and inventory of surrounding vegetation is needed for better evaluation and classification of the vegetation. Sampling beyond the confines of the project area is, therefore, necessary to verify this classification and associated conservation ranks.

General References

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